

The effect of In-Office Bleaching on the diametral tensile strength of microhybrid composite resin and resin modified glass ionomer cement = Pengaruh In-Office Bleaching terhadap kekuatan tarik diametral resin komposit mikrohibrid dan semen ionomer kaca modifikasi resin

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Abstrak

Latar Belakang: Material restorasi gigi seperti resin komposit mikrohibrid dan semen ionomer kaca modifikasi resin (RMGIC) banyak digunakan karena kekuatan estetika dan mekanisnya. Dengan meningkatnya perawatan pemutihan gigi, muncul kekhawatiran tentang efek bahan pemutih terhadap sifat mekanis material-material ini, terutama karena terbatasnya penelitian tentang kinerja jangka panjang setelah paparan pemutihan. Tujuan: Penelitian ini bertujuan untuk mengevaluasi dampak pemutihan in-office menggunakan hidrogen peroksida 35% terhadap DTS resin komposit mikrohibrid dan RMGIC. Metode: Penelitian eksperimental in vitro ini dilakukan pada 40 spesimen silindris (diameter 6 mm × tinggi 3 mm) yang dibagi menjadi empat kelompok resin komposit mikrohibrid dan RMGIC, dengan dan tanpa pemutihan. Setelah penyinaran LED (1300 mW/cm², 20 detik) dan penyimpanan dalam air suling (37°C, 24 jam), spesimen menjalani pemutihan menggunakan hidrogen peroksida 35% selama tiga siklus 15 menit. DTS diukur menggunakan universal testing machine, dan hasilnya dianalisis dengan analisis statistik. Hasil: DTS resin komposit mikrohibrid sedikit menurun setelah pemutihan in-office dari $47,37 \pm 9,24$ MPa menjadi $46,94 \pm 7,02$ MPa, sementara RMGIC menunjukkan penurunan dari $13,04 \pm 0,96$ MPa menjadi $12,71 \pm 1,82$ MPa. Perubahan ini tidak signifikan secara statistik ($p > 0,05$), dengan resin komposit mikrohibrid tetap mempertahankan DTS yang secara signifikan lebih tinggi dibandingkan RMGIC ($p = 0,001$). Kesimpulan: Aplikasi pemutihan in-office menggunakan hidrogen peroksida 35% memiliki efek minimal dan tidak signifikan secara statistik terhadap DTS resin komposit mikrohibrid dan RMGIC, menunjukkan keamanan untuk penggunaan klinis, meskipun penelitian lebih lanjut tentang efek jangka panjang direkomendasikan.

.....Background: Dental restorative materials such as microhybrid composite resin and resin modified glass ionomer cement (RMGIC) are widely used for their combination of aesthetic appeal and mechanical strength. With the growing popularity of tooth-whitening treatments, there is increasing concern about how bleaching agents might affect these materials' mechanical properties. While existing studies indicate that in-office bleaching treatments generally have minimal impact on the diametral tensile strength (DTS) of composite resins. Despite the insights provided by prior studies, there is limited information regarding how these interactions might affect the long-term mechanical properties of microhybrid composite resins. Additionally, research on RMGIC's response to bleaching remains scarce, underscoring the importance of studying its mechanical performance after exposure to in-office bleaching agents. Objective: This study aimed to evaluate the impact of 35% hydrogen peroxide bleaching on the DTS of microhybrid composite resin and RMGIC. Methods: This experimental in vitro study was conducted on 40 cylindrical specimens (6 mm diameter × 3 mm height) divided into four groups: microhybrid composite resin (with and without bleaching) and RMGIC (with and without bleaching). Specimens were cured with a second-generation LED curing unit (1300 mW/cm², 20 seconds) and stored in distilled water at 37°C for 24 hours. Bleaching was

performed using 35% hydrogen peroxide for three 15-minute cycles. DTS was measured using a universal testing machine, and the results were analyzed with paired t-tests. Results: The DTS of microhybrid composite resin slightly decreased after in-office bleaching (from 47.37 ± 9.24 MPa to 46.94 ± 7.02 MPa), while RMGIC showed a decrease from 13.04 ± 0.96 MPa to 12.71 ± 1.82 MPa. These changes were not statistically significant ($p > 0.05$). Comparisons between materials revealed that microhybrid composite resin exhibited significantly higher DTS than RMGIC both before and after in-office bleaching ($p = 0.001$). Conclusion: The application of 35% hydrogen peroxide in-office bleaching had minimal and statistically insignificant effects on the DTS of microhybrid composite resin and RMGIC, suggesting that short-term bleaching protocols are safe for these materials. Further studies are needed to investigate the long-term effects and repeated in-office bleaching cycles to ensure material durability in clinical settings.